

Bioremediation of Hydrocarbon Contaminated Soil

"The mandate of Natural Environment Recovery Inc. (NER) is to design and operate nature-friendly technologies to remediate contaminated soil, groundwater, freshwater and marine systems. To ensure that this mandate is carried out, NER combines expertise in project management, biochemical engineering, process chemistry and water resources. NER has always been strongly committed to advancing its proprietary bioremediation technologies. In addition, NER continues to develop new ways of integrating other compatible technologies, making possible the treatment of a wider spectrum of contaminants and media."

G.F. Itamunoala,
President
Natural Environment Recovery Inc. (NER)
Richmond Hill, Ontario

THE COMPANY

Natural Environment Recovery Inc. (NER) is a Richmond Hill-based company that provides cleanup services to industry, government and private landowners. These services include using bioremediation to destroy petroleum hydrocarbons in contaminated soils and groundwater. NER also provides rapid spill response services, hazardous waste treatment and passive cleanup systems based on the natural breakdown of inorganic and organic pollutants. One example of a passive system approach is the cleanup of acid mine drainage.

THE CHALLENGE

NER has demonstrated, on a commercial project, an ex situ (off site) bioremediation technology capable of:

- * breaking down a range of organic contaminants, including petroleum (BTEX) and PAH compounds;
- * treating a variety of soil types, from low-permeability clays to coarse grained sands;



NER set of 8 Bio-Reactors

- * operating safely in close proximity to a residential neighborhood;
- * meeting all these objectives at a cost that is competitive with other technologies (between \$50 and \$60 per cubic metre).

TECHNOLOGY DESCRIPTION

NER developed a mobile ex situ bioremediation technology. Bioremediation uses micro-organisms to break down contaminants into less harmful substances such as carbon dioxide and water. The NER bioremediation process adds natural acclimated microbes (bioaugmentation) and proprietary nutrients (biostimulation) to the contaminated media. Unique to NER is the nutrient Fiton™. Fiton™ causes the microbes to metabolize contaminants rapidly and enables aerobic microbes to function in areas where oxygen is scarce or virtually non-existent. When using Fiton™, further addition of oxygen (air) is unnecessary.

The NER bioreactors hold the contaminated soil in modified, open-top marine containers (40 ft. long x 8 ft wide x 10 ft high). To distribute the microbial and nutrient suspension, the bioreactors use a combination of spray

nozzles and subsurface injection probes. Each bioreactor runs as an independent unit with a capacity to treat approximately 50 m³ (100 tonnes) per batch. NER can operate its ex situ bioreactors in virtually any location accessible by transport trailer.

RESULTS

NER applied its ex situ bioremediation technology to the cleanup of approximately 7,000 cubic metres of hydrocarbon-contaminated soil. The demonstration site is located near Toronto's Don River, where the former Polyresins and Domtar facilities operated paint processing and paper manufacturing facilities respectively. NER was contracted by the Metropolitan Toronto Region Conservation Authority (MTRCA) to clean up the contaminated soil.

Results show that even highly impermeable soils (k, as low as 1.5 x 10⁻⁷ cm/s) can be treated to meet stringent environmental criteria quickly and cost-effectively. Soils containing high initial levels of petroleum hydrocarbons (including BTEX) and PAHs were cleaned up to Ontario Ministry of the Environment and Energy parkland/residential standards.

TECHNOLOGY OPPORTUNITIES

Bioremediation provides a safe and reliable method of permanently destroying contaminants. With its ex situ bioreactors, NER is capable of providing on-site cleanup services with a high degree of process and material control.

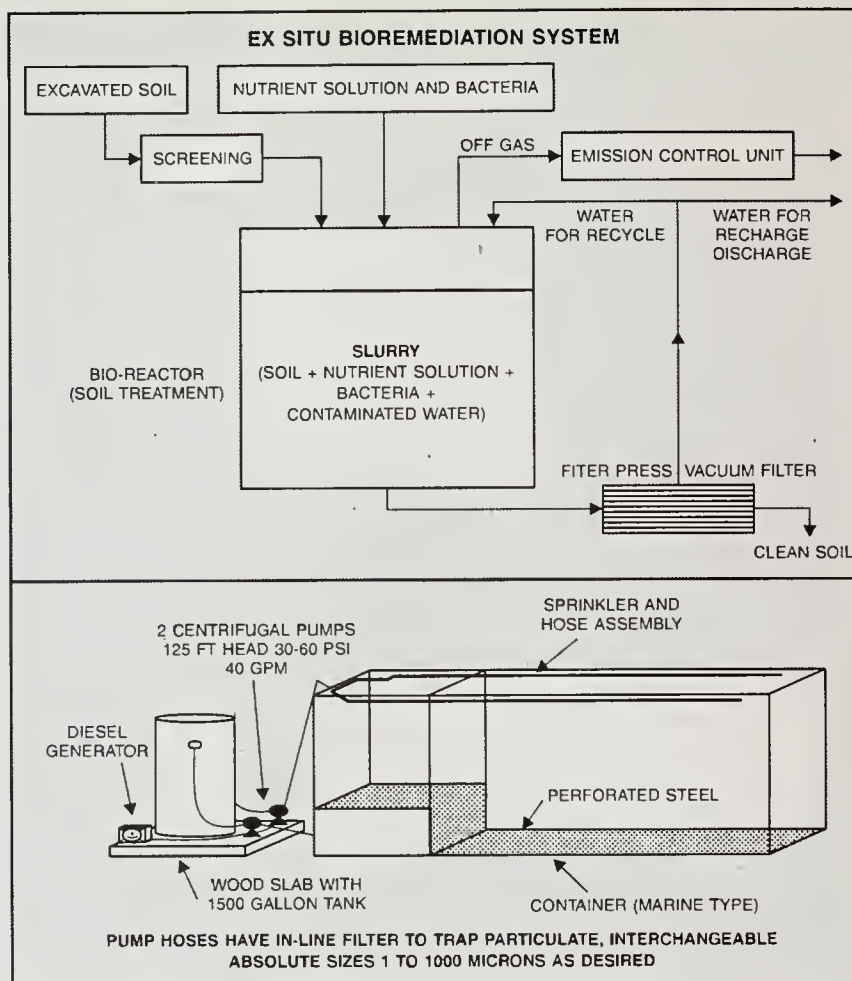
PARTNERSHIP IN POLLUTION PREVENTION AND RESOURCE CONSERVATION

The demonstration of this technology was partially funded by the Ontario Ministry of Environment and Energy and Environment Canada under the Development and Demonstration of Site Remediation Technologies (DESRT) program.

Industrial companies located in Ontario may participate in ministry/industry programs which will help them:

- * reduce, reuse and recycle solid waste;
- * effectively clean up historic pollution and destroy hazardous contaminants;
- * reduce or eliminate liquid effluent and gaseous emissions;
- * use energy and water more efficiently.

Equipment and services supply companies can benefit from the information provided on technologies identified for business development.



FOR FURTHER INFORMATION, PLEASE CONTACT

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